

for facilities, infrastructure, & environment (FMSFIE)



Bobby Carpenter

CADD/GIS Technology Center

for facilities, infrastructure, and environment

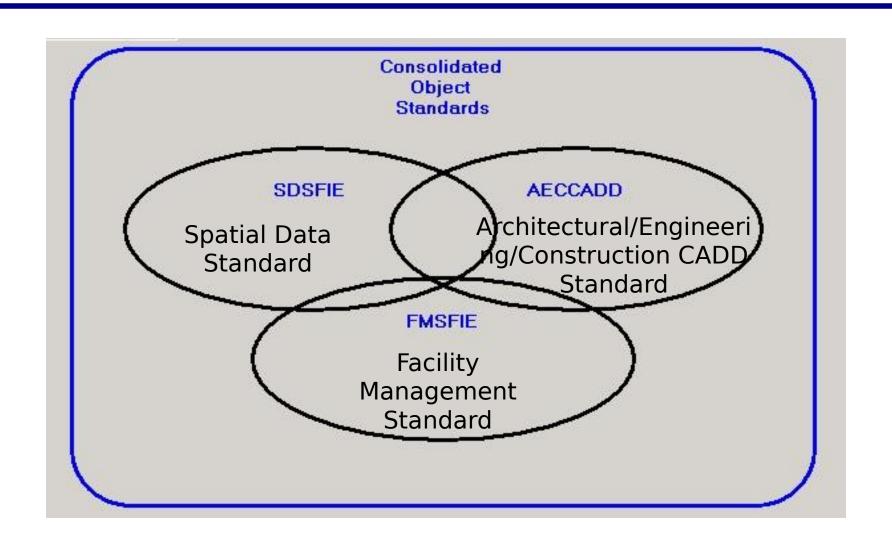
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CADD GIS Technology Center Internet URL: https://tsc.wes.army.mil









- Facility Management Standard for facilities, infrastructure, & environment
- Acronym FMSFIE
- CADD/GIS
 Technology Center
 Project No. 96.015
- Prototype
 Implementation at
 - Retusant River Naval



https://tsc.wes.army.hand.products/tssds-tsfms/fms/fmsprods.asp



- Develop Transactional Data
 Content Standard to support
 life cycle Facility Management
 (FM) functions at Military
 Installations and USACE Civil
 Works Projects.
 - Facilitate compliance with legal reporting requirements.
- Improve efficiency and lower costs associated with collection, management, analysis, and reporting of FM data.
- FMSFIE Website https://tsc.wes.army.m
 il/products/tssds-tsfm
 s/fms/fmsprods.asp

• Provide Non-Proprietary Data



Facility Management Standard (FMSFIE) - Website

- What is Available from FMSFIE Website?
 - Current FMSFIE Release (Data Standard & Software Tools)
 - Release 2.31 available today
 - Release 2.40 to be available in October 2004
 - Papers and Guidance
 - Information Model
 - Data Element Naming Conventions
 - Implementation Guide
 - PowerPoint Slides
 - FMSFIEW Models



Facility Management Standard (FMSFIE) - Website

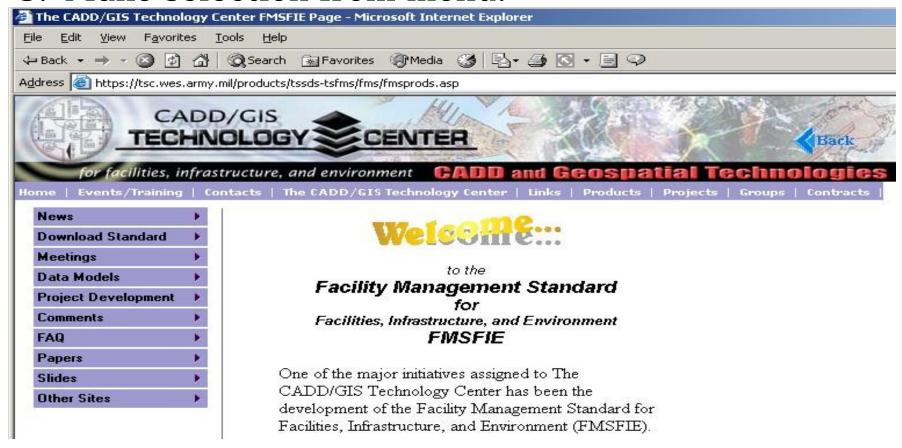
Where is Website?

- 1. Go to CADD/GIS Technology Center Website https://tsc.wes.army.mil
- 2. Select "FM Standards (FMSFIE) from



Facility Management Standard (FMSFIE) - Website

- Where is Website?
- 3. Make selection from menu.



cility Management Standard (FMSF - Development History

- 1998 2002: Facility Management Standard Developed/Published as Sub-Set of Spatial Data Standard.
 - TSSDS/TSFMS Release 1.80 February 1999
 - SDS/FMS Release 1.90 December 1999
 - SDS/FMS Release 1.95 April 2000
 - SDSFIE/FMSFIE Release 2.00 January 2001
 - SDSFIE/FMSFIE Release 2.10 January 2002
 - SDSFIE/FMSFIE Release 2.20 August 2002
- 2003 Present: Facility Management Standard





The Challenges we face

USERS



Information systems don't reflect the real work environment or provide the right information



Business information is not integrated and has little decision support capability or credibility

DEVELOPERS



- Problems
 understanding the
 Complex Business
 being supported
- Clouded big picture (vision) and approach

Facility Management Standard (FMSFIE) - Benefits

Transactiona I FMSFIE Compliant Database

Timely and accurate to enhance the business decision

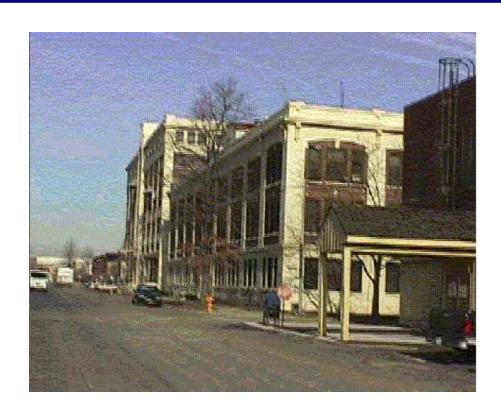
Accessible to staff, management, and customers

To streamline the operations of the entire

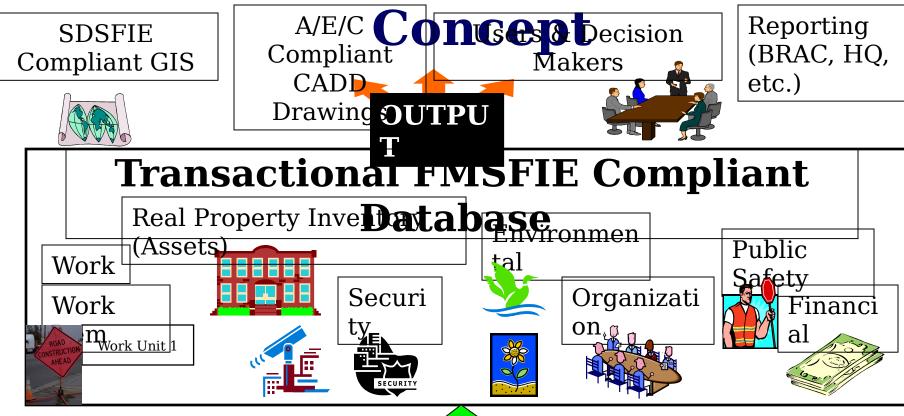


Transactional -

- Communicative actions or activities, involving multiple parties or things that reciprocally affect each other in a near real time setting that is based on life cycle events.
- Real Time, Temporal Data.

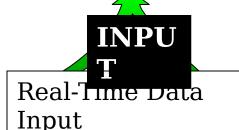


Facility Management Standard (FMSFIE) - Implementation







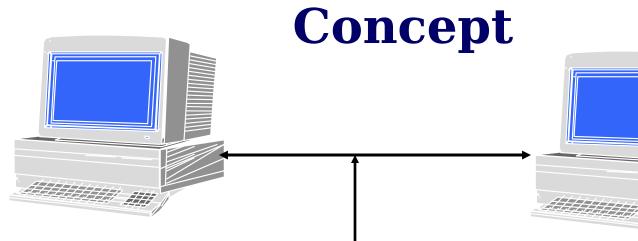








Facility Management Standard (FMSFIE) - Ideal Integration



Same

Attribu

tes

Non-Graphic Systems

- Financial
- Real Property (Assets)
- Work (Work Orders)
- Personnel
- Security



- GIS
- CADD
- Building Information Systems
- Space



Framework Based Upon:

- Prototype Implementation at Patuxent River Naval Air Station, Maryland.
- DoD & Federal Real Property Requirements.
- Integration with Spatial Data Standard (SDSFIE) Compliant GIS.
- Integration with A/E/C CADD Standard Compliant CADD Drawings.
- Compatible with Commercially Available GIS, CADD, & Relational Database Software.
- FM Focus and other Groups.

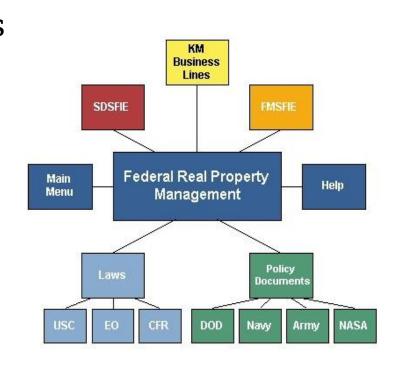


- Web Site to contain U.S. Codes and Executive Orders governing acquisition, maintenance, and disposal of Real Property holdings.
- Provide Traceability Matrix listing of Federal Legal Reporting Requirements Supported by FMSFIE and SDSFIE. Coverage expanded each Fiscal Year.
- Provide web-based FMSFIE

 Data Dictionary for FMSFIE

 Information Model (Sets,

 Into Mass army.mi



Where is RPM Website?

- 1. Go to CADD/GIS Technology Center Website https://tsc.wes.army.mil
- 2. Select "Real Property Regulations from "The CADD/GIS Technology Center" menu



FMSFIE Entity Set

Entity Set	Entity Set Description	Enity Class Link
asset_management	Items comprising an inventory of Federal real property and other related entities based on classification and need to support organizational requirements. Includes: (1) tangible physical items comprising the inventory of Federal real property that can be referenced by location; (2) non-tangible items that cannot always be defined by a location, or do not exist as an inventory item in the real property management inventory.	Class Link
environmental_management	Defines the stewardship responsibilities as they relate to the environmental management practices.	Class Link
financial_management	Planning, programming, and execution of appropriations associated with real property management.	Class Link
information_security_management	Controlled access to data and information as it is related to the roles of personnel.	Class Link
organization_management	A structured grouping of personnel and the roles they perform as it relates to an integrated work environment.	Class Link
public_safety_management	Issues related to the protection of personnel and property.	Class Link
work_management	Change management that consists of planning, programming, acquisition, operations, maintenance, revitalization, evaluation, and disposal actions affecting real property and other related entities.	Class Link

	Laws Related To FMSFIE E	Intity: Ass	sets		
	United States Co	de			
Law Number	Title		Full Text	Traceability Matrix	Statu
40 USC 285 Bu	USC 285 Buildings under control of Administrator of General Services		Full Text	Related Information	Active
	Executive Order	•			
Law Number Title		Full Text	t Traceability Matrix St		Status
EO 12512	Federal Real Property Management F	ull Text	Related Information		Active
EO 12803	Infrastructure Privatization F	ull Text	Related Information		Active
	Policy Documents Related To FMS		ty: Assets	3 (0 (
	Policy Documents Related To FMS Department of Defe		ity: Assets	3	0 (
Document Numbe	Department of Defe			S Il Text Traceability Ma	
Document Numbe DODI 4165.3	Department of Defe		Fu		atrix <mark>Stat</mark> t
	Department of Defe	ense	Fu Ful	ll Text Traceability Ma	atrix Stati
DODI 4165.3 DODI 4165.67	Department of Defe Title Uniform Facility Classes and Construction Categories	ense	Fu Ful ssistance Ful	ll Text Traceability Ma	atrix Statu ion Activ
DODI 4165.3 DODI 4165.67	Department of Defe Title Uniform Facility Classes and Construction Categories Revitalizing Base Closure Communities - Base Closure Co	ense	Fu Ful ssistance Ful	ll Text Traceability Ma I Text Related Informati I Text Related Informati	atrix Station Activ
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DODI 4165.3 DODI 4165.67 DODM 4145.19-R	Department of Deferment of Title Uniform Facility Classes and Construction Categories Revitalizing Base Closure Communities - Base Closure Costorage and Warehousing Facilities and Services Navy	ense ommunity As	Fu Ful ssistance Ful Ful	Il Text Traceability Ma Il Text Related Informati Il Text Related Informati Il Text Related Informati	on Activ on Activ

Spatial Data Standards for Facilities Infrastructure and Environment

Entity Set	Description			
auditory	The generation and detection of sounds or noise in the environment.			
boundary	The borders or boundaries that define logical or political divisions or subdivisions.	Class List		
buildings	The structures located on the face of the earth that were created, by man, to protect man and he possessions from the environment; or to enhance man's activities.			
cadastre	The man-made division of land into areas of ownership and control.	Class List		
climate	The movement and effects associated with the earth's atmosphere.	Class List		
common	The information that describes the overall data set or components of data that are common to all entity sets.	Class List		
communications	The means available to relay data and translate data.	Class List		
cultural	The activities of man that are historically significant.	Class List		
demographics	The information pertaining to man's trends or traits.	Class List		
ecology	The information pertaining to the interrelationship between organisms and their environments.	Class List		
environmental hazards	The identification and management of natural and manmade substances, materials, and condition which are, or have the potential to be, detrimental to life and ecosystems on the earth.			
fauna	The study of the animals in a region or environment.	Class List		
flora	The study of the plant life in a region or environment.	Class List		
future projects	The information that describes planned projects for future development.	Class List		
geodetic	The information pertaining to the size and shape of the earth.	Class List		
geology	The geologic features and processes occurring in a given region on the earth.	Class List		



- Contains over 1,173 Federal Laws & Policy Documents
- Contains Traceability Matrix of Federal Legal Reporting Requirements supported by:
 - All SDSFIE Entity Sets (total of 26).
 - All SDSFIE Entity Classes (total of 169).
 - All FMSFIE Entity Sets (total of 7).
 - 33 FMSFIE Entity Classes.

Site Document Information

Total Number of Laws and Policy Documents:	1173
Laws:	757
United States Codes:	265
Executive Order:	93
Code of Federal Regulations:	373
Other Laws:	25
Policy Documents:	
Department of Defense:	73
Navy:	192
Navy Claimancy:	125
Army:	50
NASA:	32
Air Force:	1
Other Policy Documents:	15
External Document Links:	1144



Step-16 en end Development Steps

Step 2: Conceptual Data Model

Step 3: Naming Conventions & Design Criteria

Step 4: Identify Priority Areas

Step 5: Logical & Physical Data Models

Step 6: FMSFIE Library

Step 7: Software Tools to Facilitate Use

Step 8: Written Guidance to

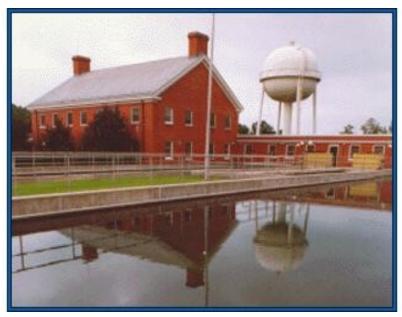




FMSFIE Strategic

FMSFIE Strategic Plan -

- Provides goals and objectives for development of FMSFIE.
- Provides plan for migrating FMSFIE to a transactional data model.
 - FMSFIE initially developed as subset of SDSFIE.
- Initial Plan Developed in 2000. Updated periodically, as required.



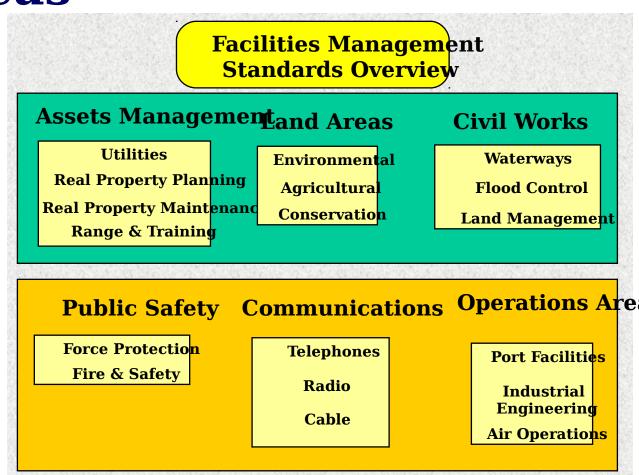
 Updated at October 2003 FMSFIE Working Meeting.



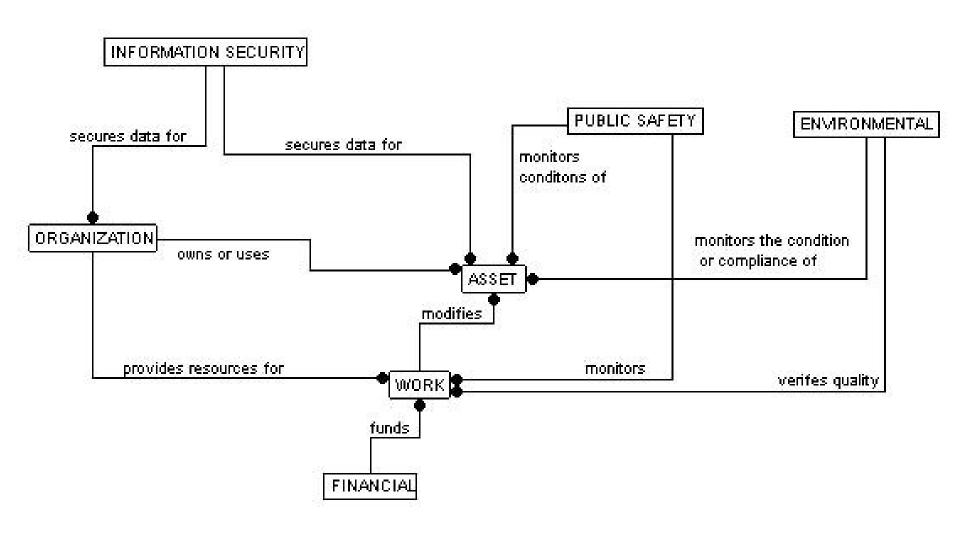
FMSFIE Broad Focus

Areas

- Broad Focus
 areas are within
 Facilities,
 Infrastructure,
 and Environment
 Business Plan for
 the Center
- Work with the Broad
 Associated
 Areas as needed to support the Broad Focus









FMSFIE - Information Model Hierarchy

FMSFIE Entity Set

FMSFIE Entity Class

FMSFIE Entity Sub-Class

> FMSFIE Entity Family

Relational Database

FMSFIE Data Table
FMSFIE Reference
Table



FMSFIE - Information Model Hierarchy Definitions

- **Entity Set:** Broad grouping of Real Property Management responsibilities.
- **Entity Class:** Sub-Grouping of an Entity Set providing grouping of similar real property classifications based upon legal reporting requirements.
- **Entity Sub-Class:** Sub-Grouping of an Entity Set based upon similar life-cycle event and temporal real property information.
- **Entity Family:** A functional sub-group of an Entity Sub-Class corresponding to different business disciplines, or different perspectives in the way data is structured below the Entity Sub-Class



FMSFIE Information Model

- Includes Seven Entity Sets:
 - Asset Management
 - Work Management
 - Environmental Management
 - Organization Management
 - Public Safety Management

 Information Security Management

Financial Managem





Asset Management:

- Items comprising an **inventory of federal real property** and other related entities based on classification and need to support organizational requirements.
- Includes:
 - Tangible Physical Items comprising inventory of
- federal real property that can be referenced by a location;
 - **Non-Tangible Items** that cannot always be defined by a
 - location, or do not exist as an inventory item in



FMSFIE - Asset Management

Tangible Physical Items:

• Items Comprising Inventory of Federal Real Property that can be Referenced by a Physical Location on the Earth.

- Can be Categorized as:
 - Facility -
 - Building, Utility, Structure
 - Equipment -
 - Personal, Minor, Industrial
 - Land -
 - Improved, Semi-Improved, Unimproved, Easement
 - Transportation -
 - Vehicles, Weight Handling Equipment, Material



FMSFIE Asset Management Entity Set - Classes

Asset Management - Set

Classes

Transportation

Non-Tangible

Core (Common)

Land (Real Property Class 1)

Facility (Real Property Class 2)

Equipment (Real Property Classes 3 & 4)



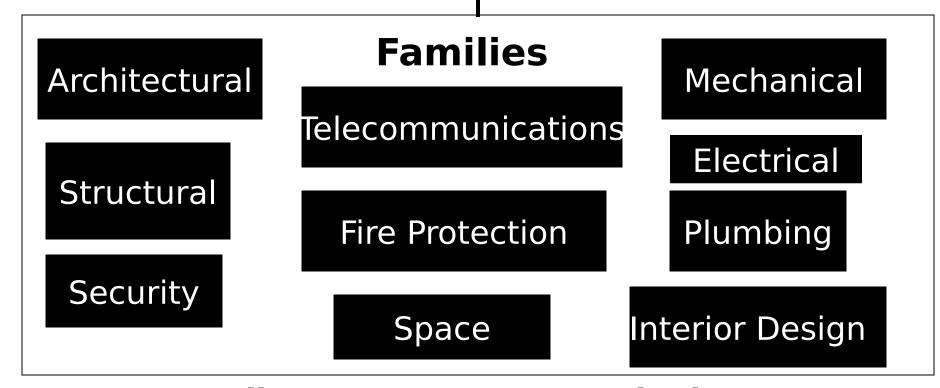
FMSFIE Asset Management Entity

Facility - Class **Sub-Classes** Building Structure Utility

Follows DoD Real Property Class 2 Model

FMSFIE Asset Management Entity Set - Facility Class

Building - Sub-Class



Follows A/E/C CADD Standard Model

FMSFIE Asset Management Entity Set - Facility Class - Building

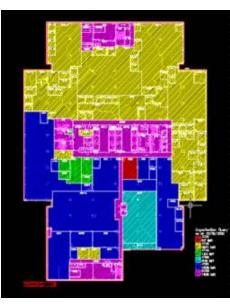
Building: Sub-Class

- Components of a Building.
- Includes Utilities and Built-In Equipment Located

Inside a Building Fire Protection







FMSFIE Asset Management Entity Set - Facility Class

Utility - Sub-Class

Water

Wastewater

Storm Water

Families

Fuel

Electrical

HVAC

Tanks

Natural Gas

Follows SDSFIE Model

FMSFIE Asset Management Entity Set - Facility Class - Utility Sub-

Utility:

Class

- Components of a Utility.
- Includes Utilities Located Outside of Buildings.

Water

Fuel





Electrical





Tanks





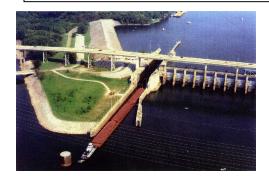
FMSFIE Asset Management Entity Set - Facility Class - Structure

Structure: Sub-Class

• Real Property Ground Improvements not associated with a Building or Utility.



Navigation





Ports & Harbors







FMSFIE Entity Set

Definitions - Cont.

- Work Management: Change management that consists of planning, programming, acquisition, operations, maintenance, revitalization, evaluation, and disposal actions affecting real property (assets) and other related entities.
- **Financial Management:** Planning, programming, and execution of appropriations associated with real property management.
- Environmental Management: Defines the stewardship responsibilities as they relate to the environmental management practices.
- Public Safety Management: Issues related to the protection of personnel and property.
- Organization Management: A structured grouping of personnel and the roles they perform as it relates to an integrated work environment.



FMSFIE - Design Considerations

- Compatible with Commercially Available Relational Database Management System (RDMS) Software.
- Compatible with SDSFIE & A/E/C CADD Standards.
- Compatible with Commercially Available CADD & GIS Software.
- Compatible with Microsoft Windows Operating Systems.
 - □ Windows 2000 & XL
- Define Data Model to Support Federal FM Legal Reporting Requirements.
- Support DISA and ISO Naming Conventions.
- Support Transactional Data Model & Schema.
- Provide User-Friendly Naming Conventions.
 - □ One Table Name & Attribute Field Name.
 - □ Table Names & Attribute Field Names are Meaningful to User.
 - □ Support Current & Future RDMS (i.e., DOS is not supported).



FMSFIE Relational Database - Table Definitions

- **Data Table**: Relational database table comprising a grouping of similar records.
 - Also called Attribute table.
 - Database table used by Users for data entry.
- **Reference Table:** Relational database table containing a listing of valid, permissible, or reference values.
 - Also called Domain and Lookup Values.
 - Incorporate SDSFIE Domain Values, where applicable.



Why Use a Relational Database?

- Data organization organized by functional area
- Data updates change 1 table, not multiple tables
- Less redundancy data stored once
- Sharing of data sharing = savings



- Database A structured collection of data items about a specific topic
 - ✓ Cell Storage unit for each data item
 - √ Table A group of similar records
 - Field a "column" of related cells
 - Record a "row" of related cells
 - ✓ Key A field with a unique identifier
 - Primary Key / Foreign Key

KEY	STUE	DENTS
ID#	LAST NAME	FIRST NAME
100	Smith	John
107	Erickson	Colleen
112	O'Brien	Debbie
123	Pierce	Kevin
1399	Smith	John



Relational Database

- In a relational database, more than 1 database table can be 'linked' or 'joined' together.
- Two basic components:
 - □ **Relationship** The joins (linkage) between database tables - Requires a unique identifier.
 - Primary Keys Unique identifier for each record in a database table.
 - Foreign Keys Unique identifier for records in another database table, that are related through database joins (linkage).
 - **Reference Table (Domain Table) -** Provides a set of valid values for a field.

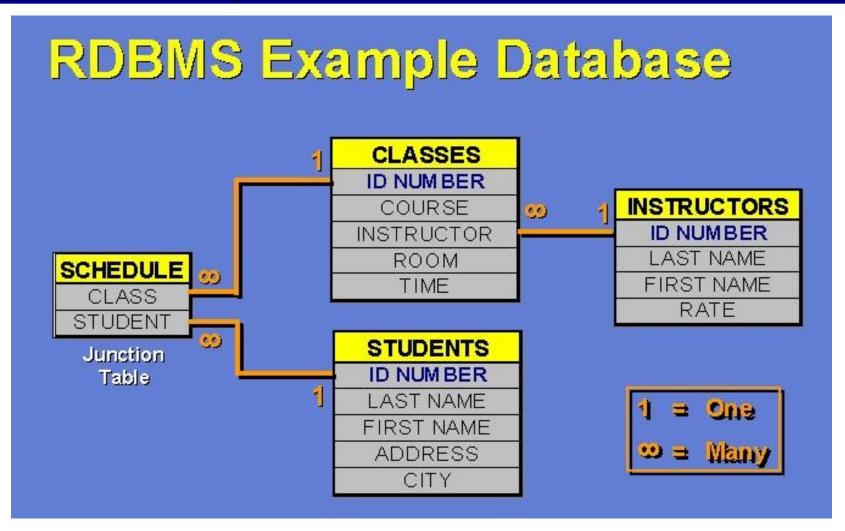


Commercially Available Relational Database Management System

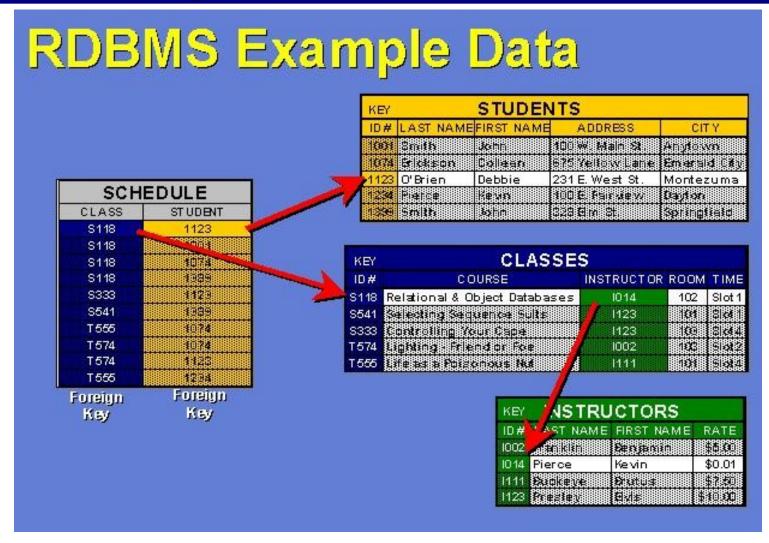
(RDMS) Software

- Microsoft Access
- Oracle
- SQLServer
- Informix
- Paradox
- FoxPro
- Sybase

Relational Database Management System (RDBMS)



Relational Database Management System (RDBMS)





What is the Relationship?

ASSET_SAI	ASSET_I	ASSET_N
1D	8000	ITL <mark>Bl</mark> dg
2	1006	Environ Lab

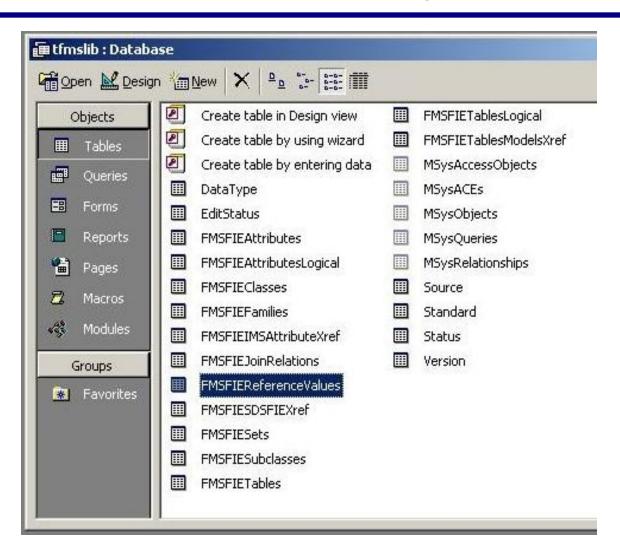
ASSET_SAI	ASSET_I	INSPECT_DA
P	800	12- 01 -1994
2	1006	4-25-
1	8000	<u> 1988</u>
	•	1998

By creating a relations hip, informati on can be linked together and doesn't have to be stored

or

ility Management Standard (FMSFI FMSFIE Data Library

- Updated Annually
- Filename tfmslib.mda
- Automatically in "FMSFIE" folder under "Program Files".





FMSFIE Concepts

Pipe

PIPE Table	KEY TYPE
PIPE_SAID	Primary
PIPE_MAT_TYP_SAID	Foreign
PIPE_USE_TYP_SAID	Foreign
PIPE_INSTALL_TYP_SAID	Foreign

SAID = System Assigned Identifier



3

4

FMSFIE Concepts

PIPE

	PIPE_S	AID - PK	
	PIPE_M	IAT_TYP_SAID -	
	FK	_	
l	PIPE_M	IATERIAL_TYPE_RI	EF
PIPE_MAT_TYP_S	SAID -	PIPE_MAT_TYP_C	PIPE_MAT_TYP_N
PK		D	M
		I	1

Polyvinyl Chloride

Ductile Iron

Steel

Copper

CD = Code (C16 as per SDSFIE)

COPPER

STEEL

PVC

NM = Name (Common or Long Name)

DUCTILE IRON



FMSFIE Concepts

PIPE

PIPE SAID - PK

PIPE_USE_TYP_SAID -

FK

PIPE_	USAGE_TYPE_REF	-
	PIPE_USE_TYP_C	PIPE_USE_TYP_N
PK	D	M
1	WATER_MAIN	Water Main
2	SANITARY_SEWE	Sanitary Sewer
	R	
3	NATURAL_GAS	Natural Gas
4 CD = Code	BLDG WATERSFIE	Building Water

NM = Name (Common or Long Name)



FMSFIE Concepts

PIPE_SAID - PK
PIPE_INSTALL_TYP_SAID - FK

PIPE_INS	TALLATION_TYPE	_REF
PIPE_INSTALL_TYP_SA ID - PK	PIPE_INSTALL_T YP_CD	PIPE_INSTALL_T YP_NM
1	UNDERGROUND	Under Ground
2	ABOVE_GROUND	Above Ground
3	BUILDING	Building
4	SUBMERGED	Submerged



What is the FMSFIE Toolbox?

Desktop Tools -

- □ Self-contained Microsoft Visual Basic (32 bit) Applications for Windows Operating Systems.
 - Releases 2.30 & 2.31 (October 2003 & March 2004) Browser
 - Release 2.40 (October 2004) Browser & Database Builder
- □ Install and Run on Personal Computer with Windows Operating System. (Windows 2000 and XP)
- □ No Additional Software Required.
- Most current Release available for download from CADD/GIS Technology Center FMSFIE Internet Web Site.

Web Browser -

- □ Web-based Browser developed using Microsoft .NET technology.
 - Release 2.40 (October 2004)



FMSFIE Toolbox - Desktop Tools

Desktop Browser:

• Provides tool for viewing & printing the various components of the Data Standard. (Releases 2.30, 2.31, & 2.40)

Desktop Access Database Builder:

• Provides a tool for building FMSFIE compliant Microsoft Access 2000 database tables, complete with the relational joins between tables. (Release 2.40)

Desktop Transactional Database Builder:

• Provides a tool for building FMSFIE Compliant Oracle and Microsoft SQL Server databases. (Release 2.40)

2004 Geospatial Symposium and Exposition

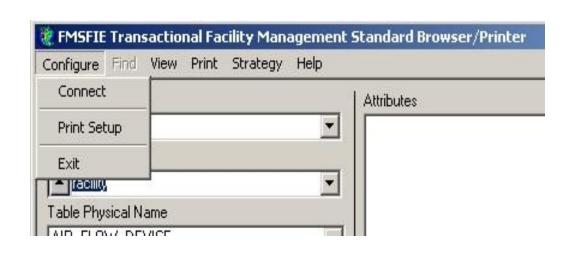
FMSFIE Toolbox - Beta Release 2.40 Desktop Browser



FMSFIE Toolbox -Desktop Tools

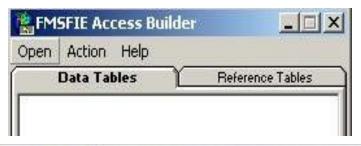
Library Connection:

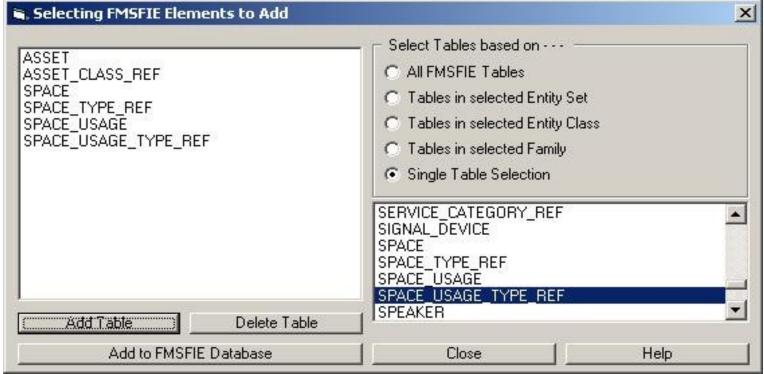
- Make sure you are connected to most current FMSFIE Library.
- Select "Connect" from "Configure" Menu.
- Browse to Folder containing most current FMSFIE Release.



1SFIE Data Connections			
ibrary Location			Browse.
C:\Program Files\FMSFIE\Release.240			
Connect	Help	Cancel	and Close

FMSFIE Toolbox - Beta Release 2.40 Desktop Access Database Builder







QUESTIONS?

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